



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005**

August 7, 2003

EA-03-123

Garry L. Randolph, Senior Vice  
President and Chief Nuclear Officer  
Union Electric Company  
P.O. Box 620  
Fulton, Missouri 65251

**SUBJECT: CALLAWAY PLANT - NRC RADIATION SAFETY TEAM INSPECTION REPORT  
05000483/2003-09**

Dear Mr. Randolph:

On May 23, 2003, the NRC completed the onsite portion of the radiation safety team inspection at your Callaway Plant. The enclosed report documents the inspection findings that were discussed with Mr. W. Witt, Plant Manager, and other members of your staff. A telephonic exit was held on July 2, 2003, with yourself and other members of your staff to discuss the final disposition of a transportation issue, as described in Section 4OA6.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your operating license. The team reviewed selected procedures and records, observed activities, and interviewed personnel. Specifically, the team evaluated the inspectable areas within the Radiation Protection Strategic Performance Area that are scheduled for review every two years. These areas are:

- Radiation Monitoring Instrumentation
- Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems
- Radioactive Material Processing and Transportation
- Radiological Environmental Monitoring Program and Radioactive Material Control Program

This inspection report documents one self-revealing finding of very low safety significance (Green). The finding was determined to involve a violation of NRC and Department of Transportation requirements. Additionally, a licensee-identified violation is listed in Section 4OA7. Because of their very low safety significance and because the findings were entered into your corrective action program, the NRC is treating these findings as noncited violations (NCVs) consistent with Section V1.A of the NRC Enforcement Policy. If you contest the validity or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the

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-2-

Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Callaway Plant facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**//RA//**

Troy W. Pruett, Chief  
Plant Support Branch  
Division of Reactor Safety

Docket: 50-483  
License: NPF-30

Enclosure: Inspection Report 05000483/2003-09  
w/Attachment: Supplemental Information

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-3-

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-4-

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**ENCLOSURE**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 50-483  
License: NPF-30  
Report No.: 05000483/2003-09  
Licensee: Union Electric Company  
Facility: Callaway Plant  
Location: Junction Highway CC and Highway O  
Fulton, Missouri  
Dates: May 19 through July 2, 2003  
Inspectors: J. Blair Nicholas, PhD, Senior Health Physicist - Team Leader  
Larry T. Ricketson, PE, Senior Health Physicist  
Michael P. Shannon, Senior Health Physicist  
Bernadette D. Baca, Health Physicist  
Approved by: Troy W. Pruett, Chief, Plant Support Branch  
Division of Reactor Safety  
Attachment: Supplemental Information

## SUMMARY OF FINDINGS

Callaway Plant  
NRC Inspection Report 05000483/2003-09

IR 05000483/2003-09; Union Electric Co; 05/19 - 07/02/2003; Callaway Plant; Radioactive Material Processing and Transportation; Radiation Safety Team Inspection

The report covered a one week period of inspection on site by a team of four region-based health physics inspectors. Two findings of very low safety significance (Green) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process," (SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### A. NRC- Identified and Self-Revealing Findings

Cornerstone: Public Radiation Safety

Green. The licensee failed to maintain contact dose rates to 200 millirems per hour or less on a package transported in an open, exclusive use shipment, in violation of 49 CFR 173.441(b)(1).

This self-revealing, noncited violation was greater than minor because the finding is associated with one of the Public Radiation Safety Cornerstone attributes (transportation packaging) and the finding affects the associated cornerstone objective (to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain). The finding was related to an occurrence in the licensee's radioactive material transportation program that was contrary to Department of Transportation regulations and, therefore, was processed through the Public Radiation Safety Significance Determination Process. The finding is of very low safety significance because it involved a radiation dose limit (200 millirems per hour) that was exceeded, but the dose rate (300 millirems per hour) did not exceed the limit by more than two times and it was not accessible to the public (Section 2PS2). (EA-03-123)

### B. Licensee Identified Violation

A violation of very low safety significance (Green) which was identified by the licensee was reviewed by the team. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking number is listed in Section 4OA7.

## 2. RADIATION SAFETY

Cornerstones: Occupational [OS] and Public Radiation Safety [PS]

### 2OS3 Radiation Monitoring Instrumentation (71121.03)

#### a. Inspection Scope

The team evaluated the adequacy of the programs to calibrate radiation monitoring instruments and to provide self-contained breathing apparatus equipment. The team interviewed cognizant licensee personnel, inspected radiation monitoring instrumentation in the field, and compared the following items to regulatory requirements:

- Operability, calibration, performance checks and alarm set points, when applicable, of selected radiation detection instrumentation
- Calibration and alarm set points of selected area and process radiation monitoring instrumentation
- Calibration source traceability
- Calibration expiration and source response check currency of pre-staged radiation detection instruments
- Status and associated surveillance and maintenance records of self-contained breathing apparatus equipment staged and ready for use in the plant
- Capability for refilling and transporting self-contained breathing apparatus air bottles during emergency conditions
- Training and qualifications of personnel who use self-contained breathing apparatus during an emergency, perform maintenance on self-contained breathing apparatus equipment, and refill air bottles
- Periodic air cylinder hydrostatic testing records
- Quality assurance audit reports, surveillance reports, and self-assessments that evaluated the radiation monitoring instrumentation program and respiratory protection program including self-contained breathing apparatus equipment (Quality Assurance Audit Reports AP-02-001 and AP-03-002, Surveillance Report SP-01-001, Self-Assessments SA002-HP-002 and SA03-HP-S02)
- Summary of corrective action documents written since April 2001 and selected Callaway Action Requests (CARs) involving radiation monitoring instruments and self-contained breathing apparatus equipment

#### b. Findings

No findings of significance were identified.



2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)

a. Inspection Scope

To ensure that the gaseous and liquid effluent processing systems were maintained so that radiological releases were properly mitigated, monitored, and evaluated with respect to public exposure, the team interviewed cognizant personnel, walked down the major components of the gaseous and liquid release systems, observed equipment material condition, and compared the observed configuration to the description in the Final Safety Analysis Report.

The team observed sample preparation, collection, and analysis of the Discharge Monitor Tank A and Unit Vent 21A and B prior to release and reviewed the associated permits. Additionally, the following items were reviewed and compared with regulatory requirements:

- 2001 and 2002 Radiological Effluent Release Report
- Changes to the Offsite Dose Calculation Manual and to the radioactive waste system design and operation
- Anomalous results and unplanned releases reported in the 2001 and 2002 Radiological Effluent Release Reports
- Effluent radiological occurrence performance indicator incidents
- Effluent radiation monitor alarm setpoint values and calculation methodology
- Special Report 2002-01, "GT-RT-21B Radiation Monitor Inoperable"
- Selected radioactive liquid waste release permits and associated projected doses to members of the public
- Compensatory sampling and radiological analyses conducted for unmonitored releases and when effluent monitors were declared out-of-service
- Monthly, quarterly, and annual dose calculations
- Engineered-safety-feature air cleaning system surveillance test results
- Surveillance test results for the stack and vent flow rates
- Records of instrument calibrations performed since the last inspection (June 2001) for each point of discharge effluent radiation monitors and flow measurement devices
- Calibration records of counting room instrumentation associated with effluent monitoring and release activities (Detectors 1 and 4)

- Quality control records for the radiochemistry counting room instruments
- Vendor audits for effluent and air cleaning system testing and analysis (Nuclear Procurement Issues Committee Audits 17795, 17440, and 18156)
- Audits and self-assessments related to the radioactive effluent treatment and monitoring program and the licensee's ability to meet the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual requirements (Quality Assurance Audits AP02-010 and AP03-003, Surveillance Report SP-01-001, and Self-Assessment in Public Dose and Occupational Radiation Protection SA03-HP-S02)
- Summary of corrective action documents written since June 2001 and selected CARs related to the radioactive effluent treatment and monitoring program and the engineered-safety-feature air cleaning systems and repetitive or significant individual deficiencies

b. Findings

No findings of significance were identified.

2PS2 Radioactive Material Processing and Transportation (71122.02)

a. Inspection Scope

The team interviewed radiation workers and radiation protection personnel involved in material processing and transportation activities and walked down the liquid and solid radioactive waste processing systems to verify that the current system configuration and operation agreed with the descriptions contained in the Final Safety Analysis Report and in the Process Control Program. The team reviewed radioactive waste processing equipment that was not operational or abandoned in place for material condition, potential unmonitored release pathways, and unnecessary personnel exposure. No shipments of radioactive materials were conducted during the inspection. Therefore, to verify that the licensee's radioactive material processing and transportation program complied with the requirements of 10 CFR Parts 20, 61, and 71 and Department of Transportation regulations contained in 49 CFR Parts 170-189, the following items were reviewed and compared with regulatory requirements:

- The adequacy of any changes made to the radioactive waste processing systems since the last inspection in November 2001
- Waste stream determination and sampling procedures
- Radioactive waste transfer and sampling procedures and waste classification methodology

- Radio-chemical sample analysis results and changes to operational parameters affecting the results for each of the licensee's radioactive waste streams
- Scaling factors and calculations used to account for difficult-to-measure radionuclides
- Part 20, Appendix G, quality assurance program
- Applicable transport cask Certificates of Compliance
- Selected transferee's licenses
- Procedures for cask loading and closure
- Training of personnel responsible for the conduct of radioactive waste processing and radioactive material shipment preparation activities
- Documentation for five non-excepted package shipments which demonstrated shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness
- Licensee audits and self-assessments related to the radioactive material processing and transportation programs performed since the last inspection in November 2001 (Quality Assurance Department Audit Report AP03-003 and Self-Assessment SA03-RW-001)
- Summary of corrective action documents written since November 2001 and selected CARs related to the radioactive material and shipping programs and repetitive or significant individual deficiencies

b. Findings

Introduction: The team reviewed the circumstances related to a self-revealing violation of 49 CFR 173.441(b)(1) that had very low safety significance.

Description: On August 14, 2002, a shipment of waste from the Callaway Plant (Shipment 02-0034) arrived at a waste processor in Oak Ridge, Tennessee. The shipment included five packages, one sea/land container of dry active waste and four boxes of polisher resin. The shipment was made on an open flat-bed style trailer as an exclusive use shipment. The waste processor surveyed the incoming shipment and documented the highest dose rate as 80 millirems per hour measured under the trailer. The waste processor unloaded and surveyed each container to determine the highest contact dose rate on each. The highest contact dose rate identified was 300 millirems per hour in a spot approximately two inches in diameter on the bottom of the sea/land container.

The waste processor notified the Callaway Plant of the finding, and the Callaway Plant sent a representative to the waste processor's facility to investigate the issue. While at the waste processor's facility, the Callaway Plant's representative confirmed the 300 millirems per hour dose rate on the bottom of the sea/land container. Prior to shipment, the licensee measured and documented 120 millirems per hour on contact with the sea/land container and 50 millirems per hour on the underside of the trailer. After reviewing the issue, the Callaway Plant concluded that items in the shipment did not shift during transport, and the survey made prior to shipment was inadequate to identify the highest dose rate. The finding was identified in the licensee's corrective action program in CAR-2002-5345.

Analysis: The team determined that the licensee's failure to adequately evaluate the contact external dose rates on the sea/land container is a performance deficiency because the licensee is expected to meet the requirements of 49 CFR 173.441(b). Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function and was not the result of any willful violation of NRC requirements or licensee procedures. The finding is more than minor because the finding is associated with one of the Public Radiation Safety Cornerstone attributes (transportation packaging) and affected the associated cornerstone objective (to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain). The finding was related to an occurrence in the licensee's radioactive material transportation program that was contrary to Department of Transportation (DOT) regulations and, therefore, was processed through the Public Radiation Safety Significance Determination Process. The finding involved a radiation dose limit that was exceeded, and the dose limit involved external radiation dose rates (49 CFR 173.441). The finding is of very low safety significance because the dose rate did not exceed the dose limit of 200 millirems per hour by more than two times, and the 300 millirems per hour dose rate was not accessible to the public.

Enforcement: 10 CFR 71.5(a) requires each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, to comply with the applicable requirements of the DOT regulations in 49 CFR Parts 170 through 189 appropriate to the mode of transport. 49 CFR 173.441(b) establishes radiation level limits for packages transported by exclusive use shipments and states, in part:

"A package which exceeds the radiation level limits specified in paragraph (a) of this section must be transported by exclusive use shipment, and the radiation levels for such shipment may not exceed the following during transportation:

(1) 200 millirems per hour (mrem/hr) on the external surface of the package, unless the following conditions are met, in which case the limit is 1000 mrem/h:

- (i) The shipment is made in a closed transport vehicle;
- (ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 mrem/h at any point on the outer surfaces of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load or enclosure if used, and on the lower external surface of the vehicle;

However, on August 14, 2002, the radiation level on the external surface of a shipment of radioactive material, made by an open transport exclusive use vehicle, exceeded 200 millirems per hour on the external surface of the package. Because the failure to comply with NRC and DOT regulations was determined to be of very low safety significance due to the fact that the highest external dose rate on the sea/land container was not accessible by a member of the public, and the issue was identified in the licensee's corrective action program in CAR-2002-5345, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000483/2003009-01).

## 2PS3 Radiological Environmental Monitoring Program and Radioactive Material Control Program (71122.03)

### a. Inspection Scope

The team reviewed the radiological environmental monitoring and meteorological monitoring programs to verify that the licensee implemented them consistent with the Technical Specifications, Technical Requirements Manual, and Offsite Dose Calculation Manual. The team interviewed members of the licensee's staff responsible for implementing the radiological environmental monitoring, meteorological monitoring, and radioactive material control programs. The team observed the following activities and equipment:

- Collection and preparation for shipment to the vendor environmental laboratory of airborne particulate and charcoal samples
- Meteorological instrumentation at the primary meteorological tower and meteorological data displays in the control room
- Surveying techniques used to monitor and control the unrestricted release of potentially contaminated materials from the radiologically controlled area

The following items were reviewed and compared with regulatory requirements to determine whether the licensee had an adequate program to verify the impact of radioactive effluent releases to the environment and to ensure that the licensee's surveys and controls were adequate to prevent the inadvertent release of licensed materials into the public domain:

- Implementing procedures for the radiological environmental monitoring program

- Environmental sample tracking and vendor environmental laboratory reporting of analytical results for 2002 and first quarter of 2003
- Four environmental air sampling stations (A-1, A-8, A-9, and B-3) and five thermoluminescent dosimetry (TLD) stations (3, 5, 9, 11A, and 45)
- Calibration and maintenance records for selected environmental air sampling equipment
- 2001 and 2002 land use census results and resulting evaluations of census data and changes to the radiological environmental monitoring program
- 2001 and 2002 Annual Environmental Operating Reports
- Vendor environmental laboratory's interlaboratory comparison program and the results for the 1<sup>st</sup> and 3<sup>rd</sup> quarters of 2001 and 2002
- Implementing procedures for the meteorological monitoring program
- Meteorological instrument operability, reliability, and 2001 and 2002 meteorological data recovery
- Procedures, methods, and instruments used to survey, control, and release potentially contaminated materials from the radiologically controlled area
- Detection sensitivities of radiation survey instruments used for the unrestricted release of potentially contaminated materials from the radiologically controlled area
- Criteria used for the unrestricted release of potentially contaminated material from the radiologically controlled area
- Quality assurance and vendor audits, and department self-assessments related to radiological environmental monitoring, meteorological monitoring, and release of radioactive material programs (Quality Assurance Audit Report AP02-010, Public Dose and Occupational Radiation Protection Self-Assessment SA03-HP-S02, Meteorological Instrumentation Self-Assessment SA01-HP-003, and Nuclear Procurement Issues Committee Audit 17795)
- Summary of corrective action documents written since August 2001 and selected Callaway Action Requests related to the radiological environmental monitoring, meteorological monitoring, and release of radioactive material programs and repetitive or significant individual deficiencies

b. Findings

No significant findings were identified.

#### 40A2 Problem Identification and Resolution

##### Cross-Reference to PI&R Findings Documented Elsewhere

Section 2OS3 evaluated the effectiveness of the licensee's problem identification and resolution processes in the radiation monitoring instrumentation and self-contained breathing apparatus equipment programs. No findings of significance were identified.

Section 2PS1 evaluated the effectiveness of the licensee's problem identification and resolution processes in the radioactive gaseous and liquid effluent treatment and monitoring systems program and the engineered-safety-feature air cleaning systems. No findings of significance were identified.

Section 2PS2 describes a self-revealing finding for exceeding the required contact dose rate on the external surface of a sea/land container during shipment when using an exclusive use open flat-bed type vehicle. Consequently, the recipient of the shipment notified the licensee that the shipment arrived at its destination with the highest contact dose rate of 300 millirems per hour in a spot approximately two inches in diameter on the bottom of the sea/land container which was greater than NRC and DOT regulations.

Section 2PS3 evaluated the effectiveness of the licensee's problem identification and resolution processes in the radiological environmental monitoring, meteorological monitoring, and radioactive material control programs. No findings of significance were identified.

#### 40A6 Meetings, including Exit

On May 23, 2003, the team presented the inspection results to Mr. W. Witt, Plant Manager, and other members of the staff who acknowledged the findings presented. The team presented the final inspection results concerning the disposition of the transportation issue to Mr. G. Randolph, Senior Vice President and Chief Nuclear Officer, and other members of licensee management during an exit meeting conducted by telephone on July 2, 2003. The licensee acknowledged the final disposition of the transportation issue.

The team asked the licensee whether or not any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

#### 40A7 Licensee Identified Violation

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a noncited violation.

Technical Specification 5.4.1.a requires written procedures be established, implemented, and maintained covering the activities referenced in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Appendix A, Section 7 references

procedures for control of radioactivity. Section 3.1 of Procedure HTP-ZZ-02005, "Handling and Control of Radioactive Material," Revision 24, stated, in part, prior to removal from the RCA, any item that has entered the RCA shall meet the requirements of unconditional release. Section 2.7 of this procedure defined unconditional release as the release of materials or equipment from radiological controls after a survey determines that radioactive material is not present. On October 2, 2001, and November 5, 2002, the licensee identified a total of three examples in which detectable licensee radioactivity was found outside the radiologically controlled area, as described in the licensee's corrective action program in CAR-2001-06283 and CAR-2002-07234, respectively. Using the Public Radiation Safety Significance Determination Process, the team determined that the finding is of very low safety significance and is being treated as a noncited violation because it was a radioactive material control issue, it was not a transportation issue, public exposure was not greater than 5 millirems from each event, and there were less than 5 occurrences in which licensed material was released outside the protected area.



**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

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K. Young, Manager, Regulatory Affairs

NRC

J. Hanna, Resident Inspector

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

NONE

Opened and Closed During this Inspection

05000483/2003009-01	NCV	Dose rates on the external surface of a package in excess of DOT limits (Section 2PS2)
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Previous Items Closed

NONE

## LIST OF DOCUMENTS REVIEWED

### **Section 2OS3: Radiation Monitoring Instrumentation (71121.03)**

#### Radiation Instrument Callaway Action Requests:

2001-04230, 2001-05501, 2001-06385, 2002-02418, 2002-03789, 2002-03902, 2002-05590, 2002-05831, 2003-01192, 2003-01537, and 2003-02250

#### SCBA Callaway Action Requests:

2001-01504, 2002-04806, 2002-03956, 2002-07009, 2003-00037, 2003-01860, and 2003-02057

### **Section 2PS1: Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)**

#### Radiological Effluent Monitoring Program Callaway Action Requests:

2001-03660, 2001-05892, 2002-01437, 2002-01492, 2002-01973, 2002-06136, 2002-06618, 2002-07059, 2003-00586, 2003-01860, 2003-02725, 2003-03128, 2003-03453, and 2003-03730

### **Section 2PS2: Radioactive Material Processing and Transportation (71122.02)**

#### Radioactive Material Processing and Transportation Program Callaway Action Requests:

2002-07267, 2002-02235, 2002-03919, 2002-05345, 2003-00974, and 2003-03485

### **Section 2PS3: Radiological Environmental Monitoring and Meteorological Monitoring Programs (71122.03)**

#### Radiological Environmental Monitoring Program Callaway Action Requests:

2002-05052, 2002-08134, 2003-00743, 2003-00745, 2003-00747, 2003-00874, 2003-02147, 2003-02154, and 2003-02190

#### Meteorological Monitoring Program Callaway Action Requests:

2002-00267, 2002-02353, 2002-05532, 2002-05614, 2002-07029, and 2003-00533

#### Release of Radioactive Material Callaway Action Requests:

2001-06283, 2002-03919, 2002-04567, and 2003-01730